

Method and System for Controlling Hourglass Deformations of Solid Elements in Finite Element Analysis

ABSTRACT

Hourglass deformations due to zero-energy or hourglass modes in rank-deficient solid elements must be effectively controlled, or the deformations may grow large and produce an unrealistic deformed geometry. Traditional methods of hourglass control allow error to accumulate by measuring hourglass deformation with incremental terms throughout a solution, which may produce inaccurate results due to unrealistic hourglass deformations. The present invention discloses a new method to control hourglass deformation without any incremental accumulations. Instead the nodal forces to resist hourglass deformations are calculated basing on the initial nodal coordinates and current nodal coordinates at each cycle. The present invention is implemented in a finite element software product.